FBXL4 gene

F-box and leucine rich repeat protein 4

Normal Function

The *FBXL4* gene provides instructions for making a member of a family of proteins called F-box and leucine rich repeat proteins. Like other members of this family, FBXL4 associates with a group of proteins to form a complex. The protein complex that contains FBXL4 is found within cell structures called mitochondria. Mitochondria are involved in a wide variety of cellular activities, including energy production, chemical signaling, and regulation of cell growth and division (proliferation) and cell death (apoptosis). Mitochondria contain their own DNA, known as mitochondrial DNA (mtDNA), which is essential for the normal function of these structures. As part of the protein complex, the FBXL4 protein is likely involved in the maintenance of mtDNA. Having an adequate amount of mtDNA is essential for normal energy production within cells.

Health Conditions Related to Genetic Changes

FBXL4-related encephalomyopathic mitochondrial DNA depletion syndrome

More than 47 mutations in the *FBXL4* gene have been found to cause *FBXL4*-related encephalomyopathic mtDNA depletion syndrome. This condition affects multiple body systems and is often fatal in early childhood. It is primarily associated with brain dysfunction combined with muscle weakness (encephalomyopathy).

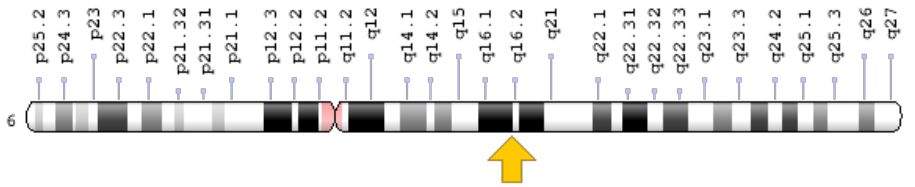
Many of the mutations that cause *FBXL4*-related encephalomyopathic mtDNA depletion syndrome impair the FBXL4 protein's ability to attach (bind) to other proteins, disrupting the formation of the protein complex, which impairs normal maintenance of mtDNA. Problems with mtDNA maintenance can reduce the amount of mtDNA (known as mtDNA depletion). Depletion of mtDNA impairs mitochondrial function in many of the body's cells and tissues. Reduced mitochondrial function eventually leads to cell dysfunction, most noticeably affecting the brain, muscles, and other tissues that have high-energy requirements. This cell dysfunction leads to encephalomyopathy and other features of *FBXL4*-related encephalomyopathic mtDNA depletion syndrome.

Leigh syndrome

Chromosomal Location

Cytogenetic Location: 6q16.1-q16.2, which is the long (q) arm of chromosome 6 between positions 16.1 and 16.2

Molecular Location: base pairs 98,868,535 to 98,948,006 on chromosome 6 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- F-box/LRR-repeat protein 4
- FBL4
- FBL5

Additional Information & Resources

Educational Resources

- Madame Curie Bioscience Database: mtDNA
  https://www.ncbi.nlm.nih.gov/books/NBK6292/#A27935

GeneReviews

- FBXL4-Related Encephalomyopathic Mitochondrial DNA Depletion Syndrome
  https://www.ncbi.nlm.nih.gov/books/NBK425540

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28FBXL4%5BTIAB%5D%29+OR+%28F-box+and+leucine+rich+repeat+protein+4%5BTIAB%5D%29%29+OR+%28FBL4%5BTIAB%5D%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D

OMIM

- F-BOX AND LEUCINE-RICH REPEAT PROTEIN 4
  http://omim.org/entry/605654

Research Resources

- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=FBXL4%5Bgene%5D
- HGNC Gene Family: F-box and leucine rich repeat proteins
  http://www.genenames.org/cgi-bin/genefamilies/set/558
- HGNC Gene Symbol Report
  http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=13601
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/26235
- UniProt
  http://www.uniprot.org/uniprot/Q9UKA2

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